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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,291	06/18/2001	Grzegorz J. Czajkowski	SUN-P6118-RSH	3914
22835	7590	09/13/2005	EXAMINER	
A. RICHARD PARK, REG. NO. 41241 PARK, VAUGHAN & FLEMING LLP 2820 FIFTH STREET DAVIS, CA 95616			ALI, SYED J	
			ART UNIT	PAPER NUMBER
			2195	

DATE MAILED: 09/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/884,291

Applicant(s)

CZAJKOWSKI ET AL.

Examiner

Syed J. Ali

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. This office action is in response to the amendment filed July 5, 2005. Claims 1-21 are presented for examination.
2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

#### *Claim Rejections - 35 USC § 103*

3. **Claims 1-3, 8-10, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haggar et al. (US 2002/0091904) (hereinafter Haggar) in view of Shaylor (US 2002/0108025).**
4. As per claim 1, Haggar teaches the invention as claimed, including a method for managing heap memory in a multitasking system, comprising:
  - reserving a guaranteed amount of heap memory for a task from a common heap in the multitasking system (paragraph 0006);
  - receiving a request from the task to allocate heap memory for a new object (paragraphs 0006-0009, 0023, 0033); and
  - if heap memory is available in the guaranteed amount of heap memory for the task, allocating heap memory for the new object from the guaranteed amount of heap memory (paragraph 0007, 0033);
  - otherwise, performing one of the following:

garbage collection on the heap memory, whereby other tasks do not need to be paused during garbage collection (paragraph 0039); and

if surplus heap memory is available in the common heap in addition to heap memory allocated to tasks, reserving an additional amount of heap memory to the task from the common heap (paragraph 0007, 0034-0035), and

allocating heap memory for the new object from the additional amount of heap memory, whereby allocating heap memory for the new object from the additional amount of heap memory delays garbage collection (paragraphs 0007, 0034-0035).

5. Shaylor teaches the invention as claimed, wherein the heap memory reserved for a task is separate from heap memory reserved for all other tasks in the common heap of a multitasking system (paragraphs 0035-0036).

6. Haggar discusses dynamically increasing the size of a memory heap in response to a request from a program that exceeds the available memory. This provides benefits in terms of delaying garbage collection and increasing the processing efficiency of the computer. Shaylor provides an improvement upon this memory allocation scheme by allocating a separate portion of physical memory for each task (paragraphs 0035-0036) and dynamically increasing the size of the allocated memory while a task is executing (paragraph 0038). It would have been obvious to one of ordinary skill in the art to combine Haggar and Shaylor since both address the deficiencies of known dynamic memory allocation methods. Both seek to provide a way of allocating memory to virtual machines to accommodate memory requests at runtime, where virtual machine tasks tend to have changing memory requirements over the course of execution.

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7. As per claim 2, Hagggar teaches the invention as claimed, including the method of claim 1, wherein if surplus heap memory is not available in the common heap in addition to heap memory allocated to tasks, the method further comprises:

performing garbage collection on heap memory to reclaim unused reserved heap memory (paragraph 0024, 0039), and

allocating heap memory for the new object from reclaimed surplus heap memory (paragraph 0024, 0039).

8. As per claim 3, Hagggar teaches the invention as claimed, including the method of claim 1, wherein reserving the guaranteed amount of heap memory from the common heap includes:

determining if there is sufficient heap memory available in the common heap (paragraphs 0033, 0039); and

if not, performing garbage collection to reclaim allocated surplus heap memory (paragraph 0024, 0039), and

reserving heap memory for the task from reclaimed heap memory (paragraph 0024, 0039).

9. As per claims 8-10, Hagggar teaches the invention as claimed, including a computer-readable storage medium storing instructions that when executed by a computer causes the computer to perform the method of claims 1-3, respectively (Fig. 2).

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10. As per claims 15-17, Hagggar teaches the invention as claimed, including an apparatus that facilitates managing surplus computer heap memory in a multitasking system comprising the method of claims 1-3, respectively (Fig. 2).

**11. Claims 4-7, 11-14, and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hagggar in view Shaylor in view of Otis (US 2002/0099765).**

12. As per claim 4, Otis teaches the invention as claimed, including the method of claim 1, wherein heap memory in the common heap is managed using a generational garbage collector (paragraph 0048).

13. It would have been obvious to one of ordinary skill in the art to combine Hagggar, Shaylor, and Otis since a generational memory organization and garbage collector allows objects that are commonly referenced to have a more permanent position in the memory. Those objects that are not referenced often are the first to be reclaimed, thereby decreasing the overall computation cost associated with garbage collection (Otis, paragraph 0008). Additionally, Hagggar indicates that any garbage collection technique may be used to manage the memory or detect unused heap memory (Haggard, paragraph 0040).

14. As per claim 5, Otis teaches the invention as claimed, including the method of claim 4, wherein a plurality of tasks share an old generation of the generational garbage collector (paragraphs 0049, 0052).

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15. As per claim 6, Otis teaches the invention as claimed, including the method of claim 5, wherein each task of the plurality of tasks has a new generation of the generational garbage collector belonging to the task (paragraphs 0052-0053).

16. As per claim 7, Otis teaches the invention as claimed, including the method of claim 4, wherein the generational garbage collector is a copying garbage collector (paragraphs 0055, 0060).

17. As per claims 11-14, Haggar teaches the invention as claimed, including a computer-readable storage medium storing instructions that when executed by a computer causes the computer to perform the method of claims 4-7, respectively (Fig. 2).

18. As per claims 18-21, Haggar teaches the invention as claimed, including an apparatus that facilitates managing surplus computer heap memory in a multitasking system comprising the method of claims 4-7, respectively (Fig. 2).

### *Response to Arguments*

19. **Applicant's arguments filed July 5, 2005 have been fully considered but they are not persuasive.**

20. Applicant argues that the garbage collection mechanism of both Haggar and Shaylor requires that *"all tasks must be paused as any and all tasks may have pointers to memory altered*

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*during the process of compacting memory or defragmenting memory.*” Applicant relies on this allegation to support the argument that *“nothing in Haggar or Shaylor...suggests that a task’s memory allocation can be garbage collected and maintained independently of memory allocated to all other tasks.”* Applicant indicates that independent claims 1, 8, and 15 have been amended to reflect this issue.

21. First, it should be noted that independent claim 15 has not been amended in the same manner as independent claims 1 and 8. For at least this reason, Applicant’s arguments are moot with respect to claim 15. Nonetheless, the merit of Applicant’s argument must be addressed with respect to claims 1 and 8.

Applicant’s conclusion that tasks must be paused during garbage collection is completely unsupported. While Haggar discusses garbage collecting the heap memory when there is insufficient memory to handle an additional request, there is no teaching in Haggar that indicates all other tasks must be paused. In fact, the basis for Applicant’s argument that tasks must be paused is that other tasks may have pointers to the altered memory area. A closer reading of Haggar would have indicated that garbage collection is not performed on portions of memory that have active pointers (paragraphs 0040-41, “exemplary operations for reclaiming memory...that is no longer in use”, “the garbage collection module...detects one or more storage blocks that are no longer in use”, “As long as there are remaining references, the storage block is maintained”, etc.).

Applicant has also suggested that there is nothing in the combination of Haggar and Shaylor that suggests garbage collecting separate task’s address spaces. While it has been noted that Haggar does not teach allocating separate memory spaces for each task, Shaylor makes up



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for this deficiency of Haggar. Using the memory management method of Haggar for each separate address space in Shaylor, e.g. by implementing it within memory manager 501 of Fig. 5 in Shaylor, each task's address space can be dynamically increased and decreased, while each can be garbage collected separately. The combination thereof comfortably shows the claim limitations.

Finally, the way in which the claims are presented does not even necessitate a showing of "performing...garbage collection on the heap memory reserved for the task..." That is, the claim states that in response to there not being enough memory available for the task, "performing **one of the following**" (emphasis added). Even if the combination of Haggar and Shaylor did not teach this limitation, which is not the position of the Examiner, the claims are drafted in such a way that this recitation does not have a limiting effect. For the foregoing reasons, Applicant's amendment and arguments are insufficient to overcome the rejection.

### *Conclusion*

22. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J. Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T. An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Syed Ali  
September 7, 2005

  
**MENG-AL T. AN**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2100**